HD1000 系列手持式溶解氧、气态氧分析仪

测量原理

电化学溶氧测量技术已成为目前应用最为广泛的溶氧测量技术，此项技术是由 Dr. Leland Clark 于 1956 年最先发明。电化学分为原电池法和极谱法。其中，极谱法应用最广。电化学(极谱法)溶氧分析仪基于传感器的结构又可以分为扩散型和平衡型两种，相对而言，扩散型的电化学溶氧传感器应用更为普及。

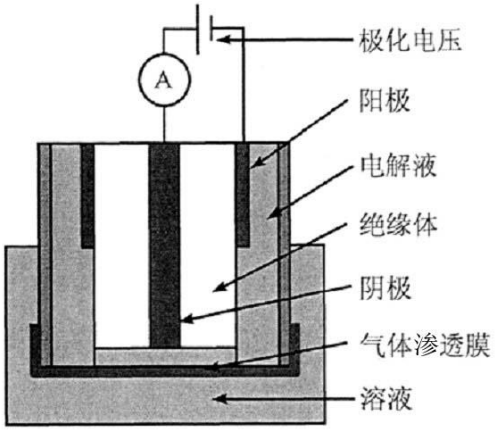


图 1：极谱法测定原理图

该传感器由阴极、阳极、电解液以及半透膜等主要部件构成，在直流极化电压作用下，溶解在水中的氧气穿过半透膜到达阴极发生还原反应：O2 + 2H2O + 4e- = 4OH-
同时阳极发生氧化反应: 4Ag + 4Cl- = 4AgCl + 4e-

当反应达到平衡稳定的条件下，该电化学反应形成的电流和氧气的分压（浓度）呈一定关系：i∞=nFA（Pm/L）Cs

当电极结构和薄膜确定之后，式中 A、Pm、L、n 等均为常数。令 K= nFA（Pm/L），则上式中：i∞=KCs。

因此可见，只要测得扩散电流 i∞，即可测得溶解氧浓度。为消除温度、盐度和气压因素影响，各型号产品采用各自技术进行补偿。根据上述电化学过程产生的电流强度就可以计算出水中的溶解氧分压，然后再根据亨利定律就可得出水中的溶解氧浓度。

和其他溶解氧测量技术相比较，极谱法溶氧测量技术具备应用量程广，精度高（特别在 ppb 痕量级溶氧测量应用场合），技术成熟等特点，目前在水处理工业各种溶氧测量场合应用最为普及和广泛。

主要特点

- **高精度：**检测精度达 0.10μg/L，分辨率达 0.01μg/L；
- **响应快：**空气中饱和氧浓度到 5μg/L 级只需 3 分钟；
- **多用途：**气体氧、溶解氧均可测量；
- **长续航：**超低功耗，4 节 7 号电池可持续续航 1200 小时；
- **长寿命：**电极使用寿命达 5 年以上，减少更换电极的使用成本；
- **使用简单：**开机即可测量，无需长时间电极极化；
- **维护方便：**正常使用电极维护周期 4~8 个月，膜片及电解液更换简易；
- **人性化设计：**整机重量仅 300 克，轻巧；磁性贴合，便捷；
- **高防护等级：**IP67；

典型应用

溶解氧测量：

发电厂及余热锅炉除氧水等低浓度微量级溶解氧分析
半导体芯片封装以及高端 PCB 超纯水工艺痕量氧监测
生活用水、养殖水、污水废水、工业用水

气态氧测量：

生物、化学反应氧气浓度检测
环境氧气浓度检测

技术参数

型号	HD1000	HD1000-M
测量范围	0.10μg/L～20mg/L	0.1μg/L～20mg/L
检测精度	±0.5μg/L	±1.0μg/L
分辨率	0.01μg/L	0.1μg/L
响应时间	T_{90}＜10S	T_{90}＜15S
温补范围	0-45℃	
测温精度	0.1℃	
补偿功能	自动温补，支持手动输入大气压和盐度补偿	
供电方式	4 节#7 号电池	
工作环境	温度 0-45℃，流量：160~500mL/min 并保持恒定	

外壳等级	IP67
主机尺寸	164(长)×75(宽)×17 (厚) mm
整机重量	300g（含流通池）

订货须知：

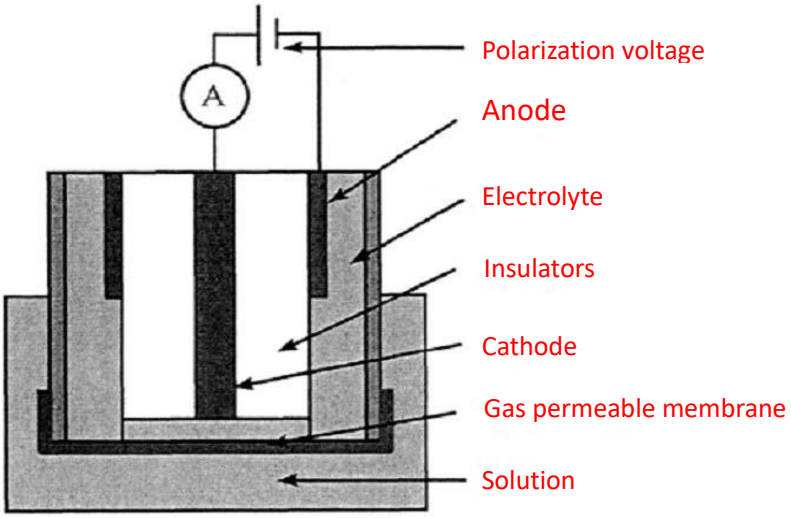
1、 确定测量范围及精度；
2、 确定测量介质温度、压力、盐度；
3、 确定取样接口尺寸；

HD1000 series handheld dissolved oxygen, gaseous oxygen Analyzer

Measurement Principle:

Electrochemical measurement technology has become the most widely used dissolved oxygen measurement technology, which was first invented by Dr. Leland Clark in 1956.Electrochemistry is divided into galvanic cell method and polarographic

method.Polarography is the most widely used method.Based on the sensor structure, the electrochemical (polarographic) dissolved oxygen analyzer can be divided into two types: diffusion type and equilibrium type.



The sensor is composed of main components such as cathode, anode, electrolyte and semi-permeable membrane. Under the action of DC polarization voltage, oxygen dissolved in water goes through the semi-permeable membrane to the cathode for reduction reaction: O2 + 2H2O + 4e- = 4OH-

At the same time, oxidation reaction occurred at the anode: 4Ag + 4Cl- = 4AgCl + 4e-

When the reaction reaches equilibrium stability, the current formed by the electrochemical reaction has a certain relationship with the partial pressure (concentration) of oxygen: I ∞=nFA (Pm/L) Cs

When the electrode structure and thin membrane are determined, A, Pm, L and n are all constants in the formula. If K= nFA (Pm/L), then I ∞=KCs.

So you can measure the concentration of the dissolved oxygen as long as you measure the diffusion current I ∞. In order to eliminate the influence of temperature, salinity and air pressure, each model adopts its own technology to compensate. The partial pressure of dissolved oxygen in water can be calculated according to the current intensity generated by the above electrochemical process, and then the concentration of dissolved oxygen in water can be obtained according to Henry's law.

Compared with other dissolved oxygen measurement technologies, polarographic dissolved oxygen measurement technology has the characteristics of wide range of application(gaseous oxygen measurement available), high precision (especially in PPB trace level dissolved oxygen measurement applications) and mature technology. Currently, it is most popular and widely used in various dissolved oxygen measurement applications in water treatment industry.

Main features:

- **High precision:** detection accuracy up to 0.10 μg/L , resolution up to 0.01 μg/L ;
- **Quick response:** it only takes 3 minutes for the saturation oxygen concentration in the air to reach 5 constant g/L level.
- **Multipurpose:** gaseous oxygen, dissolved oxygen can be measured;
- **Ultra-low power consumption:** 4 pieces of No.7 batteries can last for 1200 hours constantly running;
- **Long service life:** electrode service life of more than 5 years;
- **Simple to use:** it can be measured after starting up, no need for long electrode polarization;
- **Easy maintenance:** normal use of the electrode maintenance cycle of 4 to 8 months, membrane and electrolyte replacement easy;
- **Humanized design:** machine weight only 300 grams; Magnetic fit, convenient;
- **High protection level:** IP67;

Typical Applications:

Measurement of dissolved oxygen:

Analysis of low concentration trace grade dissolved oxygen in deoxidizing water of power plant and waste heat boiler

Semiconductor chip packaging and trace oxygen monitoring for ultra-pure water process of high-end PCB

Domestic water, aquaculture water, sewage wastewater, industrial water

Measurement of gaseous oxygen:

Biological and chemical reaction oxygen concentration detection

Ambient oxygen concentration detection

Technical Parameters:

Model	HD1000	HD1000-M
Measuring Range	0.10μg/L～20mg/L	0.1μg/L～20mg/L
Accuracy	±0.5μg/L	±1.0μg/L
Resolution	0.01μg/L	0.1μg/L
Response time	T_{90}＜10S	T_{90}＜15S
Temperature Compensation	0-45℃	
Temperature Accuracy	0.1℃	
Compensation function	Automatic temperature compensation, support manual input atmospheric pressure and salinity compensation	
Power supply	4 pieces of #7 batteries	
Operating condition	T：0-45℃，Flow：160~500mL/min（keep stable）	
Protection level	IP67	
Demension	164(Length)×75(Width)×17 (Height) mm	
Total weight	300g（including flow cell）	

Order Instructions:

1. Determine the measurement range and accuracy;
2. Determine the temperature, pressure and salinity of the measurement medium;
3. Determine the size of the sampling interface;